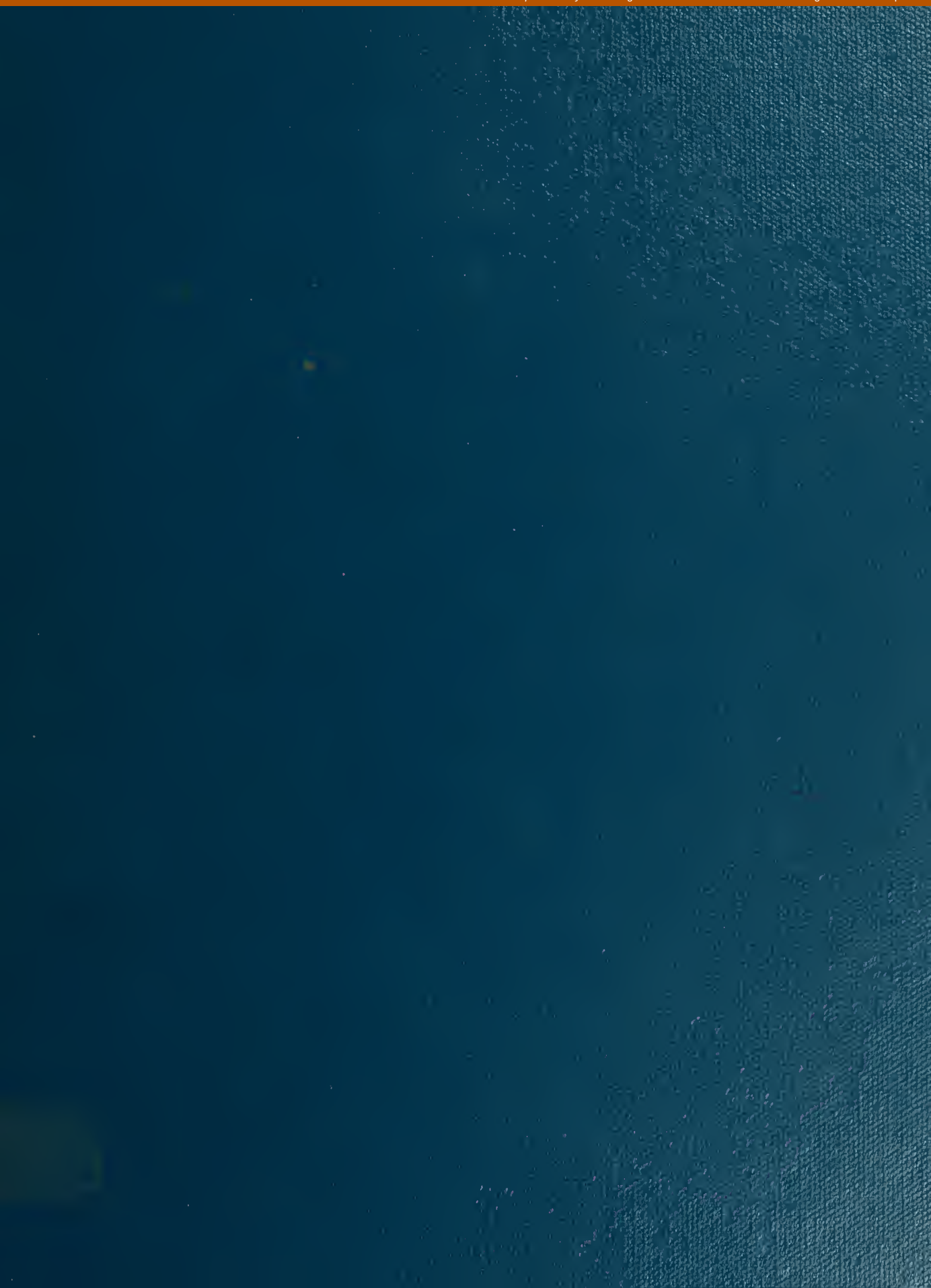

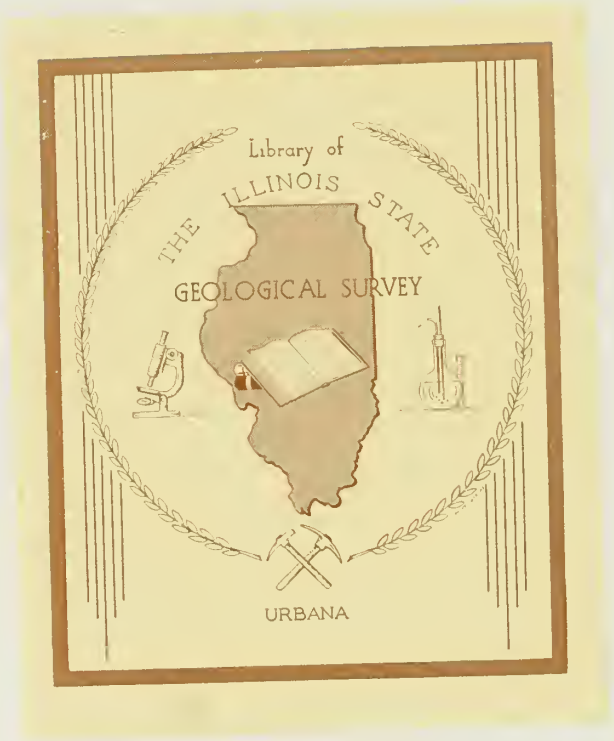

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OUTLYING OCCURRENCES OF GALENA, SPHALERITE, AND FLUORITE IN ILLINOIS

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From time to time the attention of Geological Survey staff members has been called to reports of the occurrence of galena (lead sulfide), sphalerite (zinc sulfide), or fluorite (calcium fluoride) in areas remote from the main mineralized districts in Hardin and Pope counties and in Jo Daviess and adjacent counties. Present interest in such outlying occurrences makes it worthwhile to describe them briefly. Some observations on each occurrence have been made by Survey personnel, based chiefly on examination of the occurrence or studies of well cuttings. In most instances, however, the Survey cannot attest the accuracy with which the well cuttings were taken.

The central part of Illinois is underlain by a great thickness of rocks that contain coal beds and are known as the Pennsylvanian or Coal Measures rocks. These rocks contain, at relatively numerous places, rounded or disc-shaped, clay-ironstone concretions composed of clay and the mineral siderite (iron carbonate). The interior of some of these concretions contains sphalerite or, less commonly, galena. Despite the fact that many occurrences of clay-ironstone concretions have been examined, no economically important concentrations of zinc- or lead-bearing concretions have been found. Consequently, data relating to mineral occurrences of this type in the Pennsylvanian rocks are not covered by this report.

In western Illinois in the general area around Warsaw, small amounts of galena, sphalerite, and other minerals are found in the interior of some of the rounded quartz geodes that are comparatively common in the region. Because such geodes are not known to occur in sufficient concentration to be of economic importance, no further mention is here made of them.

Union County

Galena near Alto Pass

Galena has been found in at least two and possibly more places in a fault zone (Weller and Ekblaw, 1940, pl. 1) along Hutchins Creek in the S½ sec. 1, T. 11 S., R. 3 W., and in the SW¼ sec. 6, T. 11 S., R. 2 W.

Data from manuscripts and field notes in Survey files indicate the presence of two shafts along the south side of Hutchins Creek in sec.1, one in the SW¼ and the other in the SE¼ about ¼ mile east of the first. The first shaft encountered galena in the Backbone limestone and the second in the Clear Creek chert. A third caved shaft or prospect pit was found by the writer in the Backbone limestone in the east valley wall of Hutchins Creek just after the creek makes a sharp bend to the south, near the center of the S½ sec. 1. It is not known whether galena was found in this last excavation. In addition to that in the shafts, galena mineralization has been found in limestone in a small tributary valley on the south side of Hutchins Creek in the SW¼ sec. 6.

The mineralization in sec. 1, according to Bassett (1925), consists mostly of small crystals of galena disseminated in the limestone, but "masses of galena of considerable size have been found." Recent excavations in the vicinity of the first shaft have unearthed a few of the larger masses, which apparently are found in residual clay resulting from the weathering of the limestone.

According to the fault pattern shown on Weller and Ekblaw's (1940, pl. 1) geologic map, the occurrence in sec. 6 would lie along the main fault, with the first and third shafts along a subsidiary fault about ¼ mile southwest of the main fault, and the second shaft between the two faults. Both faults trend generally northwest and unite about 2 miles northwest of the first shaft and continue thence to the northwest another mile before passing under the alluvial fill of the Big Muddy valley.

The amount of movement on the faults is difficult to determine because of insufficient data on the thickness of some of the formations involved. In the vicinity of the excavations, movement on the main fault has brought Mississippian Ste. Genevieve limestone on the northeast side against Devonian Clear Creek chert on the southwest side, with a total displacement possibly in excess of 1000 feet. Along the subsidiary fault, Devonian Backbone limestone on the southwest side is opposite Clear Creek chert and Grand Tower-Dutch Creek limestone and sandstone on the northeast side. Displacement on this fault may be as much as 200 to 400 feet.

Another occurrence of galena along what is probably the same fault zone (Geologic Map of Illinois, Weller et al., 1945) has been reported by Worthen (1868, p. 79) just north of Grand Tower, about 10 miles to the northwest of the Union County occurrences. At this locality, galena was found in the limestone "at the lower extremity of Backbone ridge" during construction of a railroad. The Backbone ridge is cut by a fault that has brought Grand Tower limestone in the northern part against Backbone limestone in the southern part of the ridge.

The economic possibilities of the Union County area are not known. There is no record of test drilling in the vicinity of the galena occurrences. They may represent only local concentrations, but the geological conditions are not unfavorable for the presence of commercial deposits.

The most favorable place for prospecting along the fault in the vicinity of Hutchins Creek is probably in the Backbone limestone, which borders the fault zone on the southwest side, northwestward from the galena occurrences. Of the three reported occurrences at this locality two were said to be in the Backbone limestone. In addition, the reported occurrence at Grand Tower was probably in the Backbone limestone.

Another possibly favorable place for prospecting in the Hutchins Creek area is the Ste. Genevieve limestone, which lies along the northeast side of the fault southeastward from the galena occurrences. This formation has been found to be a favorable host rock for the fluorspar-lead-zinc deposits of Hardin and Pope counties.

Fluorite at Anna

Fluorite formerly was visible as small vug fillings along a joint in the Ste. Genevieve limestone in the quarry of Anna Quarries, Inc., at the northeast edge of Anna. The fluorite was yellow and was accompanied by white and pink dolomite and pink calcite.

Two city water wells at Anna, a short distance south of the quarry, encountered fluorite in the St. Louis limestone. The log of City Well no. A-1 shows at a depth of 100 to 105 feet "a little disseminated purple fluorite;" the log of City Well no. A-2 shows at depths 55-60 and 75-80 feet "one fragment of purple fluorite." Inspection of the cuttings by the author revealed in addition to the disseminated fluorite a few tabular fragments containing fluorite and calcite in well no. A-1 at the 100 to 105 foot depth. These probably represent one or more fluorite-calcite veinlets. The cuttings from well no. A-2 at the depths mentioned in the log contained a few veinlets of purple fluorite in chert and traces of purple fluorite disseminated in limestone.

Neither of the above occurrences lie along faults, but faults do exist to the northeast.

Hancock County

Fluorite has been found in cuttings from the Walmar-Mitze No. 1 oil test boring in the NE¼ SE¼ SE¼ sec. 13, T. 4 N., R. 9 W., a few miles southeast of Warsaw. This well was drilled in 1931-32 by means of cable tools. Although there is some contamination of the cuttings from higher parts of the drill hole, the fluorite in the cuttings appears to be indigenous. Such contamination, however, may affect the accuracy of the data on the depth of the fluorite occurrences. Samples of the cuttings were studied and described by L. E. Workman, formerly of the Survey staff, and checked by the writer. The statements in quotes in the following paragraphs are taken from Workman's descriptions. The samples and the log of the boring are available for inspection at the Survey's laboratories in Urbana.

The shallowest occurrence of fluorite noted was in the Hannibal formation of Mississippian age where a "crystal of fluorite" was found in each of two samples of dolomitic siltstone at a depth of 327 to 336 feet. In the Grassy Creek formation, also of Mississippian age, a sample from 623 to 628 feet of silty brown shale included a "crystalline mass of yellow fluorite associated with pyrite."

At the top of the Cedar Valley (Devonian) formation at a depth of 642 to 647 feet, dolomite and sandstone are accompanied by fragments of orange, yellow, and purple fluorite, pyrite, coarsely crystalline calcite, and some galena. The sample from 647 to 651 feet was dolomite, probably cherty, containing "considerable clear crystalline calcite and yellow fluorite and some galena." Between 651 and 658 feet, cuttings of the same kind of rock contain "much pyrite and some yellow fluorite," and from 658 to 661 feet "some pyrite and a little yellow fluorite."

The cuttings from 688 to 693 feet were dolomitic limestone with "some chips of yellow and purple fluorite." Again between 712 and 720 feet the samples were dolomite associated with "considerable pyrite and fluorite."

As there is no evidence in the cuttings of replacement of the rock by fluorite or galena, it is assumed that the minerals occur as fracture or vug fillings. The Warsaw area is not known to contain faults and the cause of the localization of the fluorite and galena found in the well samples is not known.

There are two other borings in the general vicinity, one in sec. 12 and the other in sec. 11, for which there are detailed sample descriptions in Survey files, but, according to the logs, neither boring encountered fluorite or galena.

Kendall County

Sphalerite was encountered at a depth of 60 to 62 feet in a water well on the Barron farm near Millbrook. The well is located in the NE$\frac{1}{4}$ sec. 9, T. 36 N., R. 6 E. The occurrence has been interpreted by Payne (1938) as residue in a solution cavity along a fault or joint within the Sandwich fault zone. According to Payne, the description of the 2 feet of mineral-bearing material is:"Mixture; rounded fragments of dolomite, light gray, vesicular, more or less weathered, containing much finely disseminated marcasite, some sphalerite, traces of galena; loose coarse crystals of sphalerite; numerous large irregular masses of marcasite, apparently replacing plant fragments; sand, coarse, round grains."

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